

Ginkgoales had been developed as an independent branch of gymnosperms for a very long time. When the iodine numbers obtained for the two pines under consideration are compared with the general tendencies of iodine values shown in the table, the conclusion seems to be in favor of a relatively old age for *P. Jeffreyi*.

It appears from the foregoing that in addition to Lemmon's "hunch" of a more ancient origin of *P. Jeffreyi* as compared with *P. ponderosa*, we have now both biochemical and distributional evidence of the relative phylogeny of the two pines.

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ON THE IDENTITY OF CLAYTONIA NEVADENSIS WATSON

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Claytonia nevadensis was described by Watson in 1876 from a specimen collected by J. G. Lemmon in the Sierra Nevada of California. Since this first description, the species has been misunderstood repeatedly, mainly because of lack of knowledge or confusion concerning the nature of the underground parts. These parts consist of a tangled mass of slender, branching rhizomes with fibrous adventitious roots, not easily disengaged from the substratum, especially since the plant usually grows among rocks in shallow springs and runnels. The type of *C. nevadensis* Wats., (Pl. XXIX, fig. 1) upon which Watson's and later Rydberg's (N. Am. Fl. 21: 301. 1932) descriptions were based, and the type of *C. chenopodina* Greene (Pl. XXIX, fig. 2) have been examined. The underground parts of both types, especially of Greene's, are meagerly represented so that their partial or complete misinterpretation by these authors is readily understandable.

Watson, in the key to the treatment of his type material, vaguely described the underground system as composed of a "thickened caudex," while in the text he more correctly desig-

nates it as "a rather slender rootstock." He erroneously described the plant as "apparently propagating by runners." The term "thickened caudex" gives a misleading picture of the nature of the underground parts but this part of the description was perpetuated and accentuated by Rydberg (N. Am. Fl. 21: 297, 301. 1932) by his use of the phrase "cespitose rootstock." In the type specimen of *C. chenopodina* Greene, only the upper portion of the slender, branching rhizome remains. Greene, mistaking the rhizomes for a root system, described the plant as having "a fascicle of rather thick and fleshy roots." The somewhat fasciculate appearance of the specimen is due to a lateral rhizome branch which arises in close proximity to a constriction of the main rhizome. The rhizome branch and the fragment of main rhizome beyond the constriction are very similar in appearance. They do not appear as if they were originally at all "thick and fleshy." The underground parts of this specimen are typical of those of *C. nevadensis*, in which the rhizome branches are occasionally somewhat fasciculate, but there is never a cluster of thick, fleshy roots as described by Greene.

The new section *Chenopodinae* in Poellnitz's treatment of *Claytonia* (Poellnitz, K. v., *Claytonia* Gronov. und *Montia* Mich., in Fedde, Rep. Spec. Nov. Reg. Veg. 30: 280, 286. 1932) is an example of the extent to which an error may be perpetuated. This section is erected largely on the basis of the "fascicle of several rather thick and fleshy roots" described by Greene for *C. chenopodina*. "Subhastate" leaves were also used by Poellnitz as a sectional character, since Greene had so described the earlier leaves of *C. chenopodina*. Poellnitz, however, had not seen Greene's type. The leaves present on the specimen are of the form usual in *C. nevadensis*.

Claytonia nevadensis Wats. and *C. cordifolia* Wats., were cited as synonyms of *Montia asarifolia* (Bong.) Howell by Gray in the Synoptical Flora. He indicated *C. nevadensis* as "a reduced form" of *Montia asarifolia*. Jepson, in dealing with this problem (Madroño 1: 147. 1923), clearly pointed out the differences which separate *Claytonia nevadensis* from *Montia asarifolia* Gray (*sensu lato*). As to California specimens, Jepson was dealing with *Claytonia cordifolia* Wats., a plant of the northern Rocky Mountains, Cascades and northern California, probably distinct from *Montia asarifolia* (Bong.) Howell. Although separating *Claytonia nevadensis* from *Montia asarifolia*, Jepson noted their close relationship. His arguments as to the identity of *Claytonia nevadensis* as a distinct species are supported by the series of specimens which have been available to the writer.

A specimen kindly loaned by Dr. Jepson (Mount Leavitt, Tuolumne County, California, *A. L. Grant 420*) is the first collection of *C. nevadensis* which includes really adequate underground parts.

It is the material upon which Jepson based his concepts in transferring the species to *Montia nevadensis* (Wats.) Jepson. He correctly described the underground system as composed of "slender, stolon-like rootstocks." The specimen from Mount Leavitt clearly shows the rhizomatous condition of the species. Its rhizomes are slender and abundantly branched, with the branches occasionally fasciculate along the main rhizome.

The writer was present when the type of *Montia alpina* Eastwood was collected (Mount Dana, Tuolumne County, California, in a cold spring on the northwest slope at 11,000-11,500 feet, August 5, 1931, *H. P. Bracelin 526*) and since has made further observations and collections at this locality over a period of several seasons. These collections have served as a basis of comparison with the types mentioned above as well as with the specimens cited at the end of this paper. The description of *Montia alpina* contains an adequate characterization of the underground parts.

There are two collections on the type sheet of *Claytonia nevadensis*, of which the lower, attributed to Lemmon, is the type. The upper plant (Plumas County, California, August, 1877, *Mrs. R. M. Austin*) is fragmentary but seems referable to *Claytonia cordifolia* Wats. The label under the type specimen reads: "Coll. J. G. Lemmon: Sierra County, &c., 1874." It was Lemmon's custom to put his address on his labels, and he sometimes gave no clue as to the actual place of collection. Rydberg (*N. Am. Fl.* 21: 301. 1932) cites "Sierra Nevada, (side of Mount Dana), California" as the type locality of the species. He seems to have had information in addition to what appears on the type label. Lemmon, in his collecting as state botanist, visited the Mount Dana region several times. Since *Claytonia nevadensis* is very conspicuous in midsummer, growing in dense masses in the shallow springs on the northwest plateau of Mount Dana, but is relatively scarce elsewhere on the better known parts of the mountain, it is quite possible that this was the site of Lemmon's collection and is thus the type locality of Watson's species as well as of *Montia alpina* Eastwood. As further evidence that the original specimen may not have come from Sierra County, it may be noted that no other collections of the plant have been made north of Mount Leavitt in the Sonora Pass region of Tuolumne County.

The writer would restrict the use of *Montia* to those forms with a gamopetalous corolla split on one side and with three stamens (the *M. fontana* L. group). Thus considered, the species under discussion, with its regular petals only slightly united at the base and its five stamens, falls into *Claytonia*, if this genus is viewed in the broad sense as by Poellnitz (*Fedde, Rep. Spec. Nov. Reg. Veg.* 30: 280, 286. 1932). The position of the species in *Claytonia* becomes open to question, however, if Ryd-

berg's construction of the genus is accepted. In the nature of the underground parts *C. nevadensis* is closer to *Limnia* than to *Claytonia* as these genera are interpreted by Rydberg. *Limnia* is considered by him as having rootstocks and *Claytonia* as having corms or thick, fusiform roots. He includes *Claytonia asarifolia* and *C. cordifolia*, both closely related to *C. nevadensis* in *Limnia*, which, according to his conception, has three ovules per capsule and, in the perennial species, rhizomatous underground parts. Apparently on the basis of six ovules per capsule he places *C. nevadensis* in *Claytonia* rather than in *Limnia*. Since *C. nevadensis* combines the ovule number of Rydberg's narrow concept of *Claytonia*, with the rhizomatous condition of the perennial forms of *Limnia*, this species would appear to break down the distinctions between these two genera as interpreted by him.

In the latest treatment of the Portulacaceae (Pax, F., and Hoffman, K., Portulacaceae, in Engler and Prantl, Pflanzenf., ed. 2, 16C: 257. 1934), there is again an erroneous conception of the under-ground system of *Claytonia nevadensis*. It is included with those species which have a "flaschenförmiger, fleischiger Wurzel", and placed in section *Belia* (Steller) Rydb. of *Claytonia*. Actually, the nature of the underground system of this species should place it with *Montia* as these authors conceive it. Although they place stress upon the underground structures in differentiating between *Claytonia* and *Montia*, and follow an arrangement different from those of Rydberg and of Poellnitz, these authors admit the difficulties of the generic problems involved and the uncertain state of knowledge concerning these groups. Until generic distinctions in this family are clarified, the writer prefers to view *Claytonia* in the broader sense (including *Limnia*), and to delimit *Montia* as stated above. Presumably differences in floral structure are of more profound taxonomic significance than the nature of the underground parts, in which different forms of storage organs such as rhizomes, corms, or fleshy roots, may be developed.

CLAYTONIA NEVADENSIS Wats., in Brewer and Watson, Bot. Calif. 1: 77. 1876. *Montia asarifolia* Gray Syn. Fl. N. Am. 1: 273. 1897, *pro parte non* Howell, 1893. *Claytonia chenopodina* Greene, Leaflets Bot. Obs. and Crit. 2: 281. 1912. *Montia nevadensis* Jepson, Madroño 1: 147. 1923. *Montia californica* Jepson, Man. Fl. Pl. Calif. 349. 1925, as synonym. *Montia alpina* Eastwood, Leafl. West. Bot. 1: 11. 1932.

Specimens examined: CALIFORNIA. Sierra Nevada, 1874, *J. G. Lemmon* (type of *Claytonia nevadensis*, Gray Herb.); in lava loam, Mono County, at 10,000 feet, August 4, 1912, *Hatton and Maule* (type of *Claytonia chenopodina* Greene, U. S. Nat. Herb.); foot of Mount Leavitt, altitude 10,000 feet, Tuolumne County, August 29, 1915, *A. L. Grant 420* (Herb. W. L. Jepson); alpine slopes above Slate Creek, northeast of White Mountain, Mono

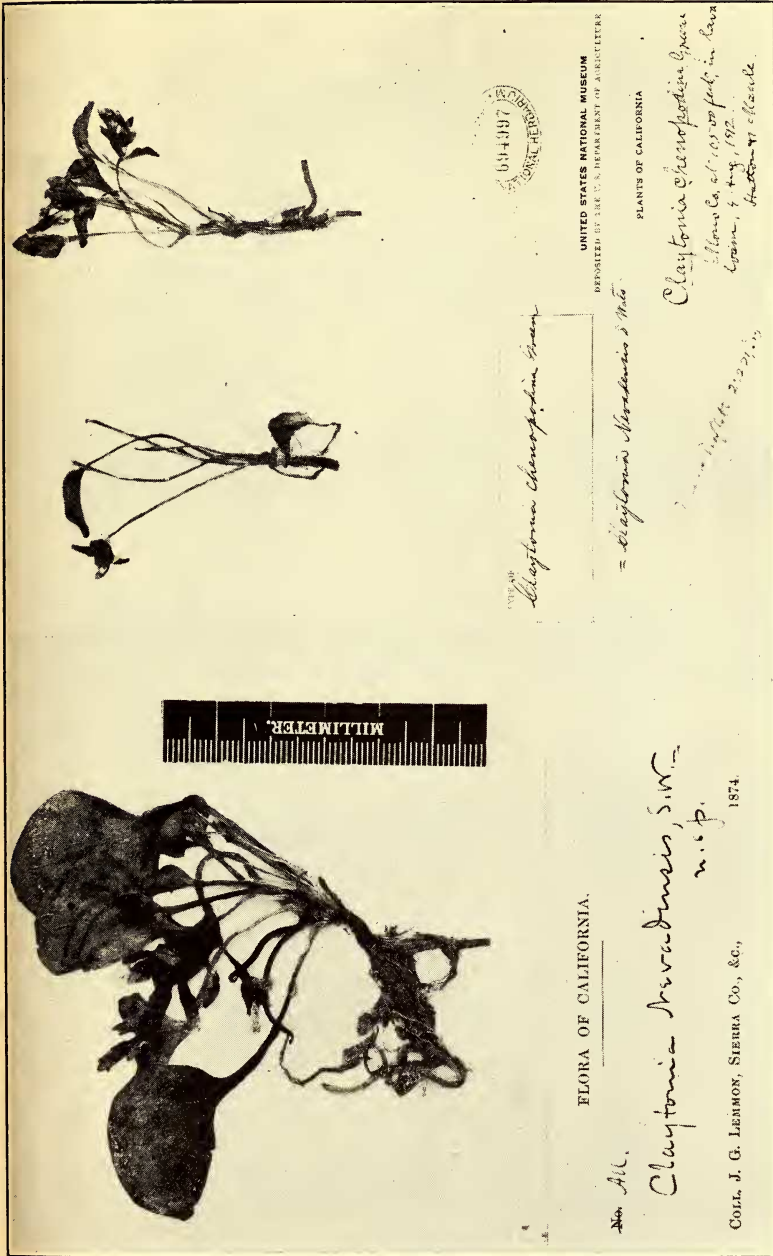


FIGURE 1
 FIGURE 2
 FIG. 1. *Claytonia nevadensis* Wats., photograph of part of type sheet. FIG. 2. *Claytonia chenopodiina* Greene, photograph of type specimen.

County, altitude 11,000 feet, in moist, flat, stony streamway, the roots from beneath stones, September 12, 1929, *H. M. Hall 12,755* (Herb. Univ. Calif.); in a cold spring on the northwest slope of Mount Dana, Tuolumne County, at 11,000–11,500 feet, August 5, 1931, *Mrs. H. P. Bracelin 526* (type of *Montia alpina* Eastwood, Herb. Calif. Acad. Sci., No. 189,088); in dense masses in shallow springs, northwest plateau of Mount Dana, altitude 11,500 feet, Tuolumne County, August 9, 1933, *C. W. Sharsmith 342* (Herb. Univ. Calif.); same locality, September 10, 1934, *C. W. Sharsmith 2019* (Herb. Univ. Calif.); same locality, September 18, 1936, *C. W. Sharsmith 2324* (Herb. Univ. Calif.); Tioga Crest, east of Saddlebag Lake, altitude 11,400 feet, Mono County, July 31, 1936, *H. L. Mason 11,462* (Herb. Univ. Calif.).

University of California,
Berkeley, May 12, 1937.

PICEA BREWERIANA IN SHASTA COUNTY

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Rumors of the occurrence of the weeping spruce (*Picea Breweriana* Wats.) in the Mount Shasta region are verified by the finding in May, 1936, of a small grove of the species on Castle Crags in the northwestern corner of Shasta County. The group occurs at an elevation of approximately six thousand feet and is near the quarter-section corner between sections 4 and 5, Township 38 N., Range 4 W. of the Mount Diablo Meridian. All of the trees seen are located in the saddle or in the gulch to the north between the main higher group of crags and the dome-like rock termed Castle or Battle Rock, which stands out a little to the east of the others. It is estimated that there are about twenty individuals, which would average fifty feet in height and up to two feet in diameter, breast high. They are associated with *Abies magnifica*, *Pinus Jeffreyi*, *P. Lambertiana*, *Arctostaphylos nevadensis*, *A. patula*, *Castanopsis sempervirens* and *Ledum glandulosum*.

This spruce is one of the most restricted in range of any species of *Picea*. It occurs in greater abundance to the northwest, in southern Oregon, and to the southwest, in Trinity County, California. The Castle Crag locality is perhaps the most easterly station. Unfortunately, the boundary of Castle Crag State Park is so situated that this grove is narrowly excluded from the preserve.

Berkeley, California,
July 22, 1937.